

Chapter 5

The Green Infrastructure: Environmental, Natural, and Heritage Resources

Abundant natural resources and a rich cultural heritage have defined Loudoun County's unique sense of place for more than 240 years. The mountainsides, forests, streams, vast stretches of agricultural land, and numerous historical sites are tangible assets that make the County an appealing place to live and work, while contributing directly and indirectly to Loudoun's economy.

The Green Infrastructure organizes the County's environmental, natural and heritage resources into a related system consisting of the Potomac River edge, stream corridors and scenic rivers, forested areas and tree stands, mountainsides, wetlands, limestone conglomerate areas, important plant and wildlife habitats, greenways and trails, scenic areas and corridors, historic and archaeological sites, and other open spaces (natural, eased and man-made) of special importance. (Refer to Green Infrastructure Map. Pg. 5-3)

In all future land use planning, the framework of the Green Infrastructure will guide where and how development and redevelopment occurs. Conservation design requires the conservation of Green Infrastructure elements on a site while providing for development at full density on the area that remains. It will be incorporated into regulations with performance standards that will support the Green Infrastructure, highlight its environmental and economic value, and provide flexibility.

The County will apply a Green Infrastructure strategy to guide the implementation of environmental policies. This strategy is based on three goals:

- Conservation – Creating a stronger relationship between natural and built environments.
- Preservation – Retaining and protecting existing environmental, natural and heritage resources.
- Restoration – Adding to the Green Infrastructure wherever possible.

The Green Infrastructure components are organized into four groups as follows:

- Group One: Natural Resource Assets (River and Stream Corridors; Scenic Rivers and the Potomac River; Surface and Groundwater Resources; Geologic and Soil Resources; Forests, Trees and Vegetation; and Plant and Wildlife Habitats)
- Group Two: Heritage Resource Assets (Historic and Archaeological Resources, and Scenic Areas and Corridors)
- Group Three: Open Space Assets (Greenways and Trails, Parks and Recreation, Public School Sites, and Open Space Easements)

- Group Four: Complementary Elements (Air Quality, Lighting and the Night Sky, and Aural Environment)

The Green Infrastructure resources are interdependent and many of the implementation strategies will protect integrated systems, rather than individual resources. Implementation includes the following:

- Identification and mapping of the Green Infrastructure.
- Regulatory protection of the Green Infrastructure. Incentives for adding to the Green Infrastructure.
- Provisions for public and private stewardship.
- Education program about the Green Infrastructure.

Green Infrastructure Policies

1. The County recognizes its Green Infrastructure as a collection of natural, cultural, heritage, environmental, protected, passive, and active resources that will be integrated in a related system. It will provide the framework for strategic land use planning policies, provide the context for all development and ensure quality of life throughout the County. It includes major rivers, stream corridors, floodplains and wetlands; lakes; reservoirs and impoundments; limestone conglomerate, mineral resources and prime agricultural soils; steep slopes; ridges and mountain-sides; protected forests and vegetative landscapes; wildlife and endangered species habitats; heritage resources; scenic corridors, parks, greenways, trails, and recreational facilities.
2. The County will use integrated management strategies in using the Green Infrastructure to ensure that all land use planning and development respect and preserve the holistic nature of the elements of the Green Infrastructure.
3. The County recognizes that much of its Green Infrastructure is made up of natural resources that are fragile and irreplaceable and, therefore, will protect and preserve these resources in perpetuity. All natural resources will be protected and preserved to the extent that such protection and preservation is consistent with other policies of this Plan. The County's watersheds are the key natural resource element in the Green Infrastructure and will be used as its primary organizing unit.
4. The County will prepare and maintain a map of the Green Infrastructure and its elements, and identify the location of future Green Infrastructure elements as part of an integrated system and contiguous network of natural and passive open spaces, and active recreational sites.
5. A conservation design method will be applied during the land development and redevelopment processes. Elements of the Green Infrastructure will be identified with the initial submission of each proposal, as a guide to the placement of structures, drainage, utilities, and roads. Regulations will be developed with performance standards that will direct their placement.
6. The County will develop a form of conservation easement to protect open space areas in subdivisions and to ensure long-term maintenance and protection of the area. Such easements will be recorded as part of the subdivision process.
7. The *Facilities Standards Manual*, the *Land Subdivision and Development Ordinance*, and other pertinent administrative documents will be revised to implement management strategies and to model development principles based on the Green Infrastructure.

8. The County will develop reasonable criteria for open-space dedications and will expect all landowners to dedicate land, or provide fees in lieu, for general open space and/or parks. These criteria will be designed to mitigate the impacts of their development and provide open space resources for the future users and occupants of the development.
9. The County will proactively promote private, state and federal conservation programs and their allocated resources to advance conservation programs within the County through public and private means such as grants, voluntary easements, dedications, etc.
10. In addition to Countywide Green Infrastructure policies contained herein, all development within the Route 28 Corridor will comply with the Green Infrastructure policies in the *Route 28 Corridor Plan* in Chapter 6 of the *Revised General Plan*.

The Built Environment

The County will prepare and implement guidelines, incentives and regulatory measures to achieve a built environment that:

- Protects, enhances and helps to sustain the natural environment.
- Protects the health and safety of the community, provides for the quiet enjoyment of private property, and promotes the well-being of the County's inhabitants by being aesthetically attractive and varied and stimulating in its forms, scale and materials.
- Is pedestrian friendly, has a clear overall structure in its communities and neighborhoods which makes it easy for the individual to orient himself or herself in those communities and neighborhoods, and helps to establish a unique identity and sense of place in each community.
- Is cost effective for both the private and public sectors in its spatial layout and in the construction, operation and maintenance of its public facilities.

Built Environment Policies

1. The County will achieve and sustain a Built Environment of high quality, recognizing the importance of this for the health, safety, convenience and general welfare of the County's residents and visitors and its importance for the vitality of the County's economy in attracting and sustaining private investment.
2. In implementing its program for achieving and sustaining a Built Environment of high quality, the County will emphasize its role as leader and facilitator, and as a source of information on environmental design options and procedures, rather than as a regulator. It also will emphasize the use of incentives for innovation and good design and collaborative public/private/community partnerships for program implementation. These incentives will include provision for two annual awards of certificates of excellence in environmental design. One for the private enterprise meeting standards of excellence established for this award and one for the community group achieving analogous standards of excellence in community-based environmental design and maintenance.
3. The County supports and encourages opportunities and incentives for sustainable development in the Route 28 Corridor. The *Route 28 Corridor Plan* in Chapter 6 of the *Revised General Plan* contains specific goals and strategies for the area for green building design techniques which include sustainable site design and integrated energy management planning.

Group One: Natural Resource Assets

Natural Resource Assets are the elements of the Green Infrastructure that represent the most natural settings in the County, including River and Stream Corridors; Scenic Rivers and the Potomac River; Surface and Groundwater Resources; Geologic and Soil Resources; Forests, Trees and Vegetation; and Plant and Wildlife Habitats. These elements are or will be in a combination of private and public ownership. The goal for this group of elements is both preservation and, wherever practical, restoration of their natural state.

A. River and Stream Corridor Resources

The County's river and stream corridors are the largest system in the Green Infrastructure, comprising the largest natural ecosystem, supporting air quality, water quality and biological diversity. In addition to the rivers and streams that drain 100 acres or more, the corridors include associated 100-year floodplains, and adjacent steep slope areas. The river and stream corridors also contain wetlands and riparian forests and many of the County's important historic and archaeological sites.

Because of the enormous diversity and importance of the natural systems of river and stream corridors, the County desires to protect these corridors by preserving, conserving, and restoring their water quality, flood protection, aquatic and wildlife habitat, and scenic value.

To accomplish these objectives, the County will adopt a River and Stream Corridor Overlay District (RSCOD) that will protect these critical resources. (Refer to River and Stream Corridor Resources Map, pg. 5-7)

The RSCOD contains rivers and streams draining 100 acres or more; associated 100-year floodplains; adjacent steep slope areas; a management buffer around floodplains and adjacent steep slopes; a minimum no-build stream buffer; and wetlands, riparian forests, and historic and archaeological sites to the extent that they fall within the RSCOD. The 50-foot Management Buffer is flexible.

The river and stream corridor system can filter runoff and land-based pollution, filter airborne pollutants and produce oxygen (where riparian forests are encouraged), keep water temperatures cool, store flood waters and reduce floodway velocities, serve as groundwater recharge areas, provide food and habitat for fish and wildlife, and improve overall water quality. Loudoun's river and stream corridors also provide many scenic, passive recreation, and educational opportunities.

The County will strive to establish a working public and private partnership with property owners, acknowledging that the RSCOD will remain largely in private ownership. The County will also pursue acquisition of appropriate river and stream corridor assets through open space dedication or easement, purchase of development rights, and other such programs to ensure the protection of these resources for the public good.

The County will strive to preserve, protect, and manage the RSCOD through policy and regulation, and the development and implementation of strict performance standards, best management practice requirements, and permissible uses.

River and Stream Corridor Resources Policies

1. The County recognizes the importance of river and stream corridors to the health, safety and welfare of its citizens, and establishes the objectives of the RSCOD to:
 - a. Protect a dynamic and healthy river and stream corridor ecosystem.

- b. Ensure that water is clean and safe.
 - c. Protect against the damages of soil erosion and flooding.
 - d. Fulfill fish and wildlife needs.
 - e. Perpetuate biological diversity and natural resource management for their educational, enjoyment and aesthetic value.
2. The County will protect rivers and streams and their corridors through the creation of a River and Stream Corridor Overlay District (RSCOD), which will include:
 - a. Rivers and streams draining 100 acres or more.
 - b. 100-year floodplains (including major and minor).
 - c. Adjacent steep slopes (slope 25 percent or greater, starting within 50 feet of streams and floodplains, extending no farther than 100 feet beyond the originating stream or floodplain).
 - d. 50-foot Management Buffer surrounding the floodplains and adjacent steep slopes.
 - e. Wetlands, forests, historic and cultural resources, and archaeological sites that fall within the area of one or more of the above elements.
 3. A 100-foot minimum stream buffer will protect rivers and streams when the 100-year floodplain and adjacent steep slope areas do not extend beyond either bank by 100 feet, and will be considered part of the RSCOD. The minimum stream buffer is measured from the scar line landward on both sides of the stream. The minimum stream buffer provides a minimum filtration area that will ensure the maintenance of water quality and the integrity of the stream corridor. The 50-foot Management Buffer will not be added to the 100-foot minimum stream buffer.
 4. The 50-foot Management Buffer will protect the other RSCOD elements from upland disturbances and adjacent development. Only uses consistent with the objectives and functions of the overall RSCOD will be permitted in the Management Buffer.
 5. The 50-foot Management Buffer can be reduced if it can be shown that a reduction does not adversely impact the other RSCOD elements, and that performance standards and criteria, developed as part of the implementation of the river and stream corridor policies, are met and maintained. Reducing the Management Buffer may also ensure that an undeveloped residential parcel that would otherwise suffer from the placement of the Management Buffer may develop to its potential.
 6. Wetlands, riparian forests, and historic and archaeological sites located within the RSCOD will be protected in accordance with RSCOD performance standards and best management practice requirements.
 7. The County will consider adoption of the environmental regulations of the Chesapeake Bay Preservation Act (Bay Act). The County will seek to achieve those objectives of the Bay Act that are in the best interest of the County, and will actively participate in water quality initiatives to protect and improve regional water quality.
 8. The County recognizes the river and stream corridors as an essential natural element of the regional eco-system. River and stream corridors will remain largely in private ownership, but the County will pursue acquisition of key resources as part of other open space and purchase of development rights programs. The County will actively pursue a joint public and private partnership for the preservation, conservation, restoration, and management of the resources in the RSCOD.

9. The County will develop and use incentives to encourage property-owners to adhere to the performance criteria of the RSCOD.
10. The County will develop and use additional incentives to supplement federal and state incentives such as the Conservation Reserve Enhancement Program to encourage property-owners to establish and maintain a 100-foot minimum riparian stream buffer and adhere to performance criteria of the RSCOD in agricultural areas.
11. River and stream segments draining less than 100 acres are not included in the RSCOD. The County encourages the protection and preservation of these smaller stream segments through the application of conservation design techniques that will minimize disturbance and modification of such streams through the land development process.
12. Steep slopes (slopes greater than 25 percent) and moderately steep slopes (slopes of 15 to 25 percent) that are outside of the RSCOD are not governed by river and stream corridor policies. These steep slopes will be governed by separate Steep Slopes and Moderately Steep Slopes policies.
13. The County will develop a partnership with the U.S. Army Corps of Engineers (COE) regional office, responsible for implementing federal wetlands regulations, to regulate wetlands outside of the RSCOD.
14. Forests and trees that are outside of the RSCOD are not governed by river and stream corridor policies. Separate Forests, Trees and Vegetation and, where appropriate, Air Quality policies will govern these forest areas and trees.
15. Historic and archaeological sites outside of the RSCOD are not governed by river and stream corridor policies. These sites will be governed by separate Historic and Archaeological Resources policies.
16. The Zoning Ordinance will be amended, including but not limited to Floodplain Overlay District (FOD) and Scenic Creek Valley Buffer sections, to address and satisfy the ecosystem, water quality, flood protection, habitat, and use objectives of the RSCOD. Amending County ordinances and regulations will also establish strict performance standards and best management practice requirements. Performance standards and criteria will ensure the health and biological integrity of the river and stream corridors and minimize adverse impacts. Requiring best management practices for the activities permitted in the RSCOD will help to protect and conserve its natural resources and their processes, and ensure both economic and ecological success.
17. The Zoning Ordinance will be amended to address non-conformities for existing residences and for undeveloped residential parcels that fall within the buffers of the RSCOD, public water supply sources and reservoirs, scenic rivers, and the Potomac River.
18. The County will only allow development and uses in the RSCOD that will support or enhance the biological integrity and health of the river and stream corridor. Permitted uses are intended to have minimal adverse effects on wildlife, aquatic life, and their habitats; riparian forests, wetlands, and historic and archaeological sites; and will be required to complement the hydrologic processes of the river and stream corridors—including flood protection and water quality. Uses will be limited to:
 - a. Road crossings, rail crossings, bridges and drive-way crossings (only when the environmental objectives of the RSCOD can be maintained or enhanced).
 - b. Utilities and utility rights-of-way (only when the environmental objectives of the RSCOD can be maintained or enhanced).
 - c. Local and regional stormwater management facilities (subject to best management practice

- requirements).
- d. Public lakes and ponds (subject to best management practice requirements).
 - e. Public water supply reservoirs.
 - f. Historic and archaeological sites.
 - g. Paths and trails – including footpaths, biking or hiking paths, and horse trails (of a permeable material only).
 - h. Passive recreation – limited to hiking, biking, horseback riding, picnicking, camping, climbing, hunting, fishing, and wildlife viewing.
 - i. Active recreation including physical education, athletic fields, and supporting athletic elements (such as but not limited to: goals, goal posts, back stops, dug outs, fences, etc.), in minor floodplains based on standards developed. Swimming and non-powered boating on the rivers and streams only (where specific public points of entry have been identified).
 - j. Agricultural activities, but not structures – including crop planting and harvesting, and grazing (subject to appropriate best management practice requirements).
 - k. Silviculture – as required to care for forests and not commercial forestry (limited to forest preservation and tree planting; limited tree clearing and clearing of invasive species; tree trimming and pruning; and removal of individual trees; subject to appropriate best management practice requirements).
 - l. Planting native vegetation (subject to appropriate best management practice requirements).
 - m. Conservation – including stream restoration projects, facilities and activities; Adopt-A-Stream programs; scientific, nature and archaeological studies; and education programs.
19. Full density credit will be provided for the gross area of the RSCOD on a given parcel when that parcel is being developed.
20. The County will maintain a working relationship with the Federal Insurance Administration of the Federal Emergency Management Agency (FEMA) for continued participation in the National Flood Insurance Program (NFIP). The County will also commit resources to maintain the County's flood maps as a Cooperating Technical Community (CTC) in FEMA's Flood Map Modernization program.
21. The County will promote and encourage participation in the "Adopt-A-Stream" programs in order to keep river and stream corridors free of litter and debris and as a means of promoting public awareness of the County's river and stream corridors.
22. The County will develop a reliable wetlands inventory and map of wetland areas both inside and outside of the RSCOD Countywide. This inventory and map will include identification of specific vegetative cover and hydrology information such as soil drainage and hydric soils.
23. The County will support the federal goal of no net loss to wetlands in the County and will identify optimum receiving sites with priority to each geographic Policy Area within the RSCOD for the construction of new wetlands in association with adjacent stormwater management best management practices or required as part of federal wetland mitigation programs.
24. The County will study the design and implementation of the RSCOD with rivers and streams draining 70 acres or more and adjacent steep slopes of 15 percent or greater.

B. Scenic Rivers and the Potomac River

The Catoctin Creek from Waterford to the Potomac River, and Goose Creek from the Fauquier and Loudoun County lines to the Potomac River, are “Scenic Rivers” as designated by the Commonwealth of Virginia. The Scenic Rivers Program provides these rivers special status through legislative designation and aids in establishing appropriate protection and management standards to maintain their scenic value. The Goose Creek and Catoctin Creek Scenic River Advisory Boards, appointed by the Governor of Virginia, actively seek to preserve the integrity of these rivers and their surroundings.

As an important part of the County’s river and stream corridor system, protection of these Scenic Rivers will also be coordinated with the County’s River and Stream Corridor Overlay District (RSCOD) policies and regulations. The County will also work to preserve the scenic character of its Potomac River shoreline by creating Loudoun’s portion of the Potomac Heritage Trail. Open space easements have already been placed on much of the Potomac River shoreline east of Route 28 as part of this effort.

Scenic Rivers and Potomac River Policies

1. The County will protect Scenic Rivers and the Potomac River by defining a protection area as a 300-foot no-build buffer or the RSCOD, whichever is greater. Development potential may be transferred from the no-build buffer according to density transfer guidelines provided by this Plan. The RSCOD performance standards, best management practice requirements and list of permitted uses will apply to the no-build buffer.
2. The County will define and identify the viewsheds along these waterways and establish policies to guide development in these areas in order to protect their environmental and scenic quality.
3. The County will complete and execute a plan for acquiring and managing open space corridors along the County’s officially designated Scenic Rivers.
4. The County will not permit diversion of Scenic Rivers under any circumstances.
5. The County will prepare and implement corridor management plans for the County’s Scenic Rivers.
6. The Zoning Ordinance will be amended so that docks will be Special Exception uses, designed and built to maintain the existing natural and scenic character of the shoreline of Scenic Rivers.
7. The County will develop and implement a Potomac River shoreline management plan, and seek to coordinate this effort with adjacent jurisdictions (local, state, regional organizations, advisory boards, and citizen groups). This Plan should include:
 - a. The boundaries of the study area;
 - b. A comprehensive natural resources inventory;
 - c. Policy recommendations for river corridor management and protection;
 - d. A process for integrating the participating groups; and
 - e. A plan for acquiring and managing open space corridors along the Potomac River with a preference given to mechanisms such as proffers, other donations, and purchase in efforts to acquire land and/or easements.
8. The County will establish a strategy to expand passive recreational use of Scenic Rivers and the Potomac River. This strategy will be consistent with the overall Green Infrastructure policies and will prohibit ground-disturbing activities such as paved road and structure construction.

9. The County will seek proffers from developers for public access trails along the Potomac River and designated sections of Goose and Catoctin Creeks.
10. The County will seek to complete its portion of the Potomac Heritage Trail through public and private efforts as proactively coordinated with County resources.

C. Surface and Groundwater Resources

Major water resource issues for the County include ensuring an adequate supply of drinking water, protecting groundwater and surface water (i.e., streams and wetlands) from contamination and pollution, and preventing the degradation of water quality in watersheds. (Refer to Major and Sub Watersheds Map, pg. 5-13)

For most of the County's history the threats to surface and groundwater quality have been from rural land use. Soil erosion, nutrient enrichment, fecal coliform contamination, and various toxic chemicals have contributed to the degradation of surface and groundwater quality. Currently, nine stream segments in Loudoun have been placed on the state's impaired waters list by the Virginia Department of Environmental Quality (DEQ) for excessive levels of fecal coliform. As shown on the Virginia Impaired Water Segments 1998 list, they are:

- Catoctin Creek for 7.4 river miles.
- North Fork Catoctin Creek for 10.53 river miles.
- South Fork Catoctin Creek for 6.01 river miles.
- Little River for 6.25 river miles.
- Piney Run for 3.87 river miles.
- Cromwell's Run for 3.81 river miles.
- Sycolin Creek for 6.83 river miles.
- Beaverdam Creek (western) for 6.43 river miles.
- North Fork Goose Creek for 4.5 river miles.

Groundwater, supplied through wells and springs, is the primary source of drinking water for residents of the western Towns and rural areas. Additional factors such as poorly sited drainfields and drainfield saturation, high water tables, lack of septic tank maintenance, leaking sewer lines, improper disposal of household hazardous waste, and leaking or abandoned underground storage tanks can threaten the quality of wells, springs and groundwater. In addition, a preponderance of on-site, in-soil sewage disposal and wastewater treatment systems used in this part of the County has the potential to directly impact individual health as effluent passes directly into the groundwater that feeds the wells that provide drinking water.

The rapid development of eastern Loudoun since the mid-1990s has brought a new set of water resource challenges, including an increase in impervious land cover. Rainwater that once filtered through the soil to replenish groundwater is now kept above ground artificially and carried via culverts and stormwater pipes directly to local streams. This diminishes groundwater capacity, which is particularly noticeable in the summer months as streams dry up, and aquatic habitats are damaged. The County's hydrologic soil groups

and hydric soils can be indicators of surface water saturation, runoff, and infiltration rates. (Refer to Hydric Soils Map, pg. 5-15)

Streams are damaged as they take in stormwater from man-made systems, which transport water in much higher volumes and at much greater velocities than natural systems. The rushing water causes streambed scouring, as well as erosion of stream banks. Stormwater is also polluted by substances deposited on the impervious ground cover such as litter, road salt, oil, grease, and metals from automobiles.

The establishment of the River and Stream Corridor Overlay District (RSCOD) is key to protecting Loudoun County's water resources. Protecting rivers and streams, retaining natural riparian forests and vegetation, protecting wetlands; and preservation, buffering, and the implementation of performance standards and best management practice requirements in developing and redeveloping areas are all necessary components of a water protection strategy. At the same time, development should be guided by flexible regulations that encourage innovative site design and mitigation measures in order to protect the natural environment and protect and improve water quality.

A number of state and federal mandates now require the County to take on certain water protection responsibilities in addition to the federal Clean Water Act. Under these programs, maximum pollutant loads will be set by the state for a number of County streams. The programs also require the County to control pollution from land uses served by storm sewer to the maximum extent practicable.

Two sets of policies—one for Surface Water and one for Groundwater—are provided below. These policies establish County water quality goals, define protective measures and management objectives, and establish development parameters for areas around water sources.

Surface Water Policies

1. The County will fully protect, through easement, fee simple acquisition, regulatory measures or other sufficient measures, the lands that are critical to the quality of key water supplies. These areas will be re-naturalized, if necessary, to restore filtration and erosion control functions.
2. The County will promote water conservation through innovative, cost effective reuse systems, domestic water saving devices, and low impact development techniques, which integrate hydrologically functional designs with methods for preventing pollution and through informed household use.
3. The County will protect the headwaters of the Catoctin and Goose Creeks by establishing appropriate regulations for the Catoctin, Shorthill Mountain and the Blue Ridge, to limit diversions of water from the headwaters and to prevent stream pollution.
4. The County will support community programs to keep shorelines and water bodies free from debris and litter.
5. The County will establish appropriate standards including adoption of the Virginia Stormwater Management Handbook to protect natural streams from the harmful effects of increased stormwater volume and velocity resulting from development.
6. The County recognizes that soil erosion and deposits of sediment in receiving streams and water bodies is the single largest contributor to degradation of stream water quality and loss of aquatic habitat. The County will establish appropriate standards by which to regulate erosion and sedimentation.

7. The County will establish appropriate standards and land uses to protect drinking water supplies from depletion and pollution.
8. The County will protect the Bull Run as an important regional water source and supplier to the Occoquan Reservoir by defining a protection area as a 300-foot no-build buffer or the RSCOD, whichever is greater. An additional 200-foot transitional buffer will also be maintained beyond the no-build buffer. Development potential may be transferred from the no-build buffer according to density transfer guidelines provided by this Plan. The RSCOD performance standards, best management practice requirements and list of permitted uses will apply to the no-build buffer. Performance standards and a list of permitted uses for the transitional buffer will be defined as part of the implementation of this policy.
9. The County will develop and implement a watershed management plan and a watershed overlay district for all public water supply reservoir watersheds, establishing more stringent development guidelines and performance standards to protect water quality.
10. The County will protect public water supply reservoirs by defining a protection area for all reservoirs as a 300-foot no-build buffer or the RSCOD, which-ever is greater. Development potential may be transferred from this buffer area according to density transfer guidelines provided by this Plan. The RSCOD performance standards, best management practice requirements and list of permitted uses will be applied to the no-build buffer.
11. In cooperation with the LCSA, the County will set the limits of the 300-foot no-build buffer for reservoirs based on their projected expansion, so that when the proposed expansion occurs the 300-foot buffer will already be established and the area protected from development.
12. To further protect public water supply reservoirs and their contributing streams beyond established protection buffers, the County encourages the clustering of development away from designated public water sources and reservoirs and their buffers.
13. The County will work with the incorporated Towns, in conjunction with the Clean Water Act, to establish overall water quality goals and specific standards for individual streams and river and stream corridors, consistent with county river and stream corridor objectives and policies.
14. The County will prepare and implement a pollution prevention program to improve the County's surface water quality in a proactive fashion by working with other entities such as the Loudoun County Soil and Water Conservation District (LSWCD) to coordinate and technically reinforce various ongoing water quality activities and efforts.
15. The County will comply with Phase II National Pollutant Discharge Elimination System (NPDES) stormwater regulations under the federal Clean Water Act, which requires the County's municipal storm sewer system to be regulated as a discrete source of pollution. The County will meet NPDES requirements prior to the permit filing date in 2003. The Clean Water Act requires regulated jurisdictions, including Loudoun, to address six components of a surface water quality management program to obtain an NPDES permit. These include: (1) public outreach and education; (2) public involvement and participation; (3) illicit discharge detection and elimination; (4) construction site stormwater runoff control; (5) post-construction stormwater management; and (6) pollution prevention, or "good housekeeping", for municipal operations.
16. The County will prepare and implement design standards and principles to preserve open space and natural resources, minimize the creation of new impervious areas and to minimize increases in post-development runoff peak rate, frequency and volume. To the extent possible, these alternatives will

recognize the unique characteristics of different properties and the densities and uses recommended by this Plan.

17. The County will establish appropriate standards by which to regulate stormwater detention or retention to better protect the integrity of receiving streams.

18. The County will institute development standards for golf courses and restrict development of golf courses in proximity to water resources such as streams, rivers, reservoirs or floodplains to deter any degradation of these resources as a result of the golf course use. Golf courses may be allowed within the boundaries of floodplains only by Special Exception.
19. In suburban areas, water access should be provided for recreational uses. These areas will be designated in local area plans. Where paved surfaces are needed, they should be constructed of pervious paving materials when structurally feasible.
20. Loudoun County will endorse and actively support the interstate Chesapeake 2000 Agreement, a water-shed partnership signed by the governors of Virginia, Maryland, and Pennsylvania, as well as the District of Columbia and the U.S. Environmental Protection Agency (EPA). The Agreement commits Virginia to: (1) living resources protection and restoration; (2) vital habitat protection and restoration; (3) water quality restoration and protection; (4) sound land use; and (5) individual responsibility and community engagement.
21. The County will require secondary containment, treatment, and emergency response plans for activities that propose pollution sources such as the storing and dispensing of petroleum products, chemical storage and sale or transfer of potential contaminants.

Groundwater Policies

1. The County will develop and implement a comprehensive groundwater protection strategy and use available data such as that generated by the U. S. Geological Survey (USGS) in the development of such a strategy.
2. The County will develop, implement, and maintain a wellhead protection program to protect groundwater from contamination and ensure an adequate level of drinking water quality for the residents of rural Loudoun and western Loudoun Towns that are dependent on groundwater as a water source. In addition, the County will refine and strengthen existing water protection policies and regulations.
3. The County will initiate and maintain a comprehensive pollution management program to protect groundwater resources.
4. The County will periodically assess the recharge rates for groundwater in each watershed by analyzing data from groundwater level monitoring and stream flow measurements. If negative impacts are detected, the information will be presented to the Board of Supervisors for appropriate action, which may include an adjustment to the land use policies within the impacted area.
5. The County will assess the effects of groundwater consumption on the volume of surface water in streams for each watershed and develop and implement regulations to minimize those effects.
6. The County will require developments in the Suburban Policy Area to connect to available central water and sewer systems according to water and wastewater treatment policies in this Plan.

D. Geologic and Soil Resources

1. Limestone Conglomerate Areas

The County seeks to preserve and protect the unique geologic characteristics, natural beauty, tourism potential, and the quality of groundwater in its limestone conglomerate areas. Limestone conglomerate is vulnerable to sinkholes, cavity collapse and ground slippage and cannot environmentally or structurally support land development activities without performance standards and monitoring.

A belt of limestone conglomerate lies north of Leesburg and east of the Catoclin Ridge. (Refer to Limestone Conglomerate Bedrock Map, pg. 5-21) The bedrock in this area includes limestone suspended in a mixture of other geologic materials. Limestone is a carbonate rock and is subject to weathering and the formation of solution channels and sinkholes. In places, limestone bedrock also forms outcrops. Rock outcrops, sinkholes and solution channels function as conduits to the groundwater system that may be susceptible to contaminated surface run-off, leaky fuel tanks and septic tank effluent. Because the location of these channels is not well known, development risks should be considered to exist throughout the limestone conglomerate area.

Increased surface water run-off from development in this area can lead to increased cavity collapse and ground slippage which may affect sewage lagoons, ponds, pipelines and cause groundwater pollution. Ground slippage may also threaten the stability of foundations and structures built on these natural features and overlying soils.

To address the environmental and human health and safety issues in this critical area, the County will establish and maintain zoning regulations for a Limestone Conglomerate Overlay District. This zoning district will be used to support surface and groundwater monitoring, the setting of pollution prevention standards, and the establishment of performance standards governing land use and development.

Limestone Conglomerate Policies

1. The County will define and delineate a Limestone Conglomerate Overlay District based on soil and geologic characteristics.
2. Performance standards will be developed and applied to govern development on areas underlain by limestone because of a high potential for environmental damage, and to ensure public health and safety, including minimum setback distances from sinkholes, rock outcrops, and other Karst features.
3. The County will limit development to large lot or clusters within the Limestone Conglomerate Overlay District to avoid development in areas of identified Karst features.
4. Environmental protection performance standards will be developed and applied for lands within the Limestone Conglomerate Overlay District that do not have rock outcrops.
5. Agriculture, forestry, and passive recreation will be by-right uses in the Limestone Conglomerate Overlay District, but will be subject to performance standards.
6. The County will identify pollution sources and establish appropriate standards for reducing pollution in the Limestone Conglomerate Overlay District.
7. The County will monitor groundwater and surface water in the Limestone Conglomerate Overlay District, and if monitoring recognizes negative impacts, the County will present the information to the Board of Supervisors for appropriate action, which may include an adjustment to the land use policies within the impacted area.

8. The County will require approval of communal water and wastewater systems for new development in the Limestone Conglomerate Overlay District, unless it is demonstrated to the County that other types of systems achieving the same or superior performance standards are suitable.

2. Prime Agricultural Soils

Prime agricultural soils (as defined by the U.S. Department of Agriculture) are soils that are best suited for agricultural use. These soils account for approximately 19 percent of Loudoun County's soils, and are usually found in areas that are nearly level, well drained and watered. Loudoun's best agricultural soils are generally located in the Rural Policy Area. (Refer to Prime Agricultural Soils Map, pg. 5-23)

Because the County has emphasized the rural economy as an important part of its overall economic health, prime farmland and agricultural soils are especially valuable. Once this land-based resource is lost, it cannot be reclaimed. However, like other natural resources in the County, prime agricultural soils are being threatened by residential development. This is because agricultural land is also well suited for development; being well drained, generally found on mildly sloping terrain, and with good drainfield potential.

Soil erosion from development and improper soil management is becoming a significant threat to this resource. Implementation of Prime Agricultural Soils policies will be coordinated with the County's Erosion and Sediment Control Ordinance and other state and federal programs to appropriately deal with these potential problems. They will also be coordinated with the State Use Value Assessment Program and County-designated Agricultural and Forestal Districts. (Refer to Agricultural Districts Map, pg. 5-27)

Prime Agricultural Soil Policies

1. The County will utilize the Use Value Assessment Program, Agricultural and Forestal Districts and other incentive-based efforts at its disposal to encourage preservation of Prime Agricultural Soils for agricultural uses. The County will improve the Use Value Assessment Program and will develop and implement additional incentive-based regulations, if necessary, to better achieve these purposes.
2. Where development is allowed on prime agricultural soils, the County will require cluster development so that the development will take place on the least desirable soils on the site and the prime soils will be available for agricultural purposes. The quality of soils will be considered in the conservation design process established by the Zoning Ordinance.
3. Where applicable, the County will use the stormwater management and erosion control policies in this plan and in the Loudoun County Erosion and Sediment Control Ordinance to enhance conservation of Prime Agricultural Soils for agricultural uses. The County will improve the Loudoun County Erosion and Sediment Control Ordinance, if necessary, to better achieve these purposes.
4. The County will develop a public education program that will focus on communicating incentive advantages associated with private protection of Prime Agricultural Soils. The County will maintain and make available the Prime Agricultural Soils Map as part of this program. The program will also provide information on the donation of easements, tax and estate planning, and other advantages related to voluntary protection.
5. The County will seek the preservation of prime agricultural soil resources for agricultural, horticultural, and forestal use through regulatory and incentive programs such as the Purchase of Development Rights (PDR) program.

3. Mineral Resource Extraction Areas

Diabase is a hard, brittle rock used as a base component for construction of roads and for building foundations. There are defined belts of this rock, also known as trap rock, south of Leesburg and near Washington Dulles International Airport. These resource areas should be protected from incompatible land uses, particularly residential. Soils with high shrink-swell characteristics often lie on top of these diabase belts and can cause cracked foundations and severe structural damage to buildings.

The crushed-stone quarries that extract diabase are a substantial economic resource. Loudoun County diabase is some of the best rock for concrete and road base material found on the East Coast. Continuing construction activities in the greater Washington area will also ensure that diabase continues to be an important local economic resource.

Quarrying operations and related activities in diabase resource areas present a challenge to County land use planning, because, although they contribute greatly to the County's economy, they may also threaten groundwater and surface water quality. They are also a heavy industrial use and generate heavy truck traffic. The site-specific nature of extraction industries may help the County focus protection on key diabase resource areas. Encouraging buffers or compatible uses on adjacent tracts and adequate transportation routes is part of this effort. The County may also minimize the long-term result of diabase extraction by looking for ways to reclaim abandoned quarries for other uses. The County will establish and maintain zoning regulations for a protective quarry zoning district, and will emphasize the continued viability and compatibility of this important industry.

Mineral Resource Extraction Policies

1. Quarrying is an industry based on the natural resources of the County and shall be encouraged and the resource protected.
2. The County will recognize and protect its viable extraction industry. The County will protect viable quarries and its diabase resource areas from incompatible neighboring uses. New development will take existing quarries into account.
3. The County will foster efficient use of its diabase resource. To help achieve this goal, the County will maintain a quarry zoning district that should provide a total of at least 800 acres in Loudoun County to be set aside for extraction and associated activities. The quarry zoning district will make quarrying a permissible use. No residential uses other than watchman's quarters will be permitted in this district. Non-residential uses will be limited to low coverage, heavy industrial uses that will not be adversely affected by quarry operations.
4. Quarry zoning districts should be located on areas where quarries presently exist and/or in industrial communities where the diabase is within the Ldn 65-noise contour of an airport. Areas within the 65 Ldn noise contour and adjoining existing quarries should be preserved for this purpose.
5. The County will facilitate the long-range planning of quarry sites, including setting aside sufficient land for extraction and creating an environment that will be attractive for future users once the quarrying use is no longer viable.
6. The County will develop and apply standards that seek to protect existing and planned neighboring uses from the negative impacts of resource extraction activities. Such negative impacts might include threats to property values, public health and safety, as well as short- and long-term environmental degradation. Such impacts will be mitigated by buffer requirements, noise mitigation requirements, and other mitigation techniques.

7. Diabase extraction activities must be located with direct access to roads that are constructed to industrial standards. These standards will be applied so that quarries have adequate roads linking them to the regional road network.
8. The County will encourage the innovative and sensitive reuse of quarries and resource extraction sites.
9. An application to permit the development of new quarries or the expansion of existing quarries will include a concept plan for use of the site after extraction is complete.

4. Steep Slopes and Moderately Steep Slopes

Steep slopes and moderately steep slopes occupy an area of approximately 53,000 acres in the County. (Refer to Steep Slopes Map, pg. 5-29) Moderately steep slopes are areas with a 15 to 25 percent grade (identified by Slope Class D on Loudoun County soil maps). Steep slopes refer to more environmentally critical slopes of greater than 25 percent (identified by Slope Class E on Loudoun County soil maps). If improperly used and disturbance occurs, these areas could experience erosion, building and/or road failure, downstream flooding, and other hazards. For this reason, the grade of a steep slope is often a factor of unstable soils. Development on steep slopes often requires high volumes of clearing and “cut and fill.” Such earth moving is subject to erosion and sedimentation that causes adverse effects on surface water quality and aquatic habitat.

Steep slopes represent a resource as well as a constraint to development. Steep slopes protected as part of a river and stream corridor or mountainside often serve as forested and vegetative areas that filter stormwater run-off and support various plant and wildlife habitats.

The Steep Slope and Moderately Steep Slope policies apply to all steep and moderately steep slopes in the County that are not “adjacent” to a river and stream corridor (as defined in the RSCOD) or located on the mountainside. River and Stream Corridor Resource and/or Mountainside policies govern steep slopes located in those areas.

Steep Slope and Moderately Steep Slope Policies

1. The County will prohibit land disturbance on slopes with a grade of more than 25 percent and/or with the soil Slope Class of E.
2. The County will prohibit construction of roads on slopes with grades over 25 percent with the exception of access easements to existing lots where no other access is possible. Performance standards will be applied to protect the soils, vegetation and other environmental features in areas in which these roads are allowed by special exception.
3. Special performance standards are to be used to protect slopes with grades from 15 to 25 percent and/or with the soil Slope Class of D. These standards will include best management practices, locational clearances for clearing and grading, and approval of natural drainageways.
4. There will be no building on unstable soils, including soil series Morven (soil mapping unit 13), Airmont (27 and 59), Lew (88), and Springwood (90 and 91) as described in the County’s Interpretive Guide to the Use of Soils Maps in Loudoun County, Virginia.
5. The County will encourage development rights to be sold, donated or proffered from land with a 15-to-25 percent grade.

5. Mountainside Areas

The County's mountains and mountainside areas contribute to its beauty, quality of life, and geologic uniqueness and are valued by residents and visitors. Mountainsides are highly sensitive to land disturbance and development. In addition to the destruction of prime viewsheds, uncontrolled land disturbance within mountainside areas can cause major soil slippage if trees and vegetation are removed; the soil is disturbed through cutting, filling or blasting; or the moisture level is upset by excessive drawdown or increased water runoff. Mountainsides contain the headwaters to many of the County's streams and are important groundwater recharge areas. They are the location of unique flora, vegetation, and plant communities and provide a variety of wildlife habitats. These features create an environmental system that is unique to this region and that contributes to the scenic character of rural Loudoun County.

The County will control development on the mountain-sides through a Mountainside Development Overlay District (MDOD) that contains land use restrictions and performance standards to minimize the destruction of individual resources and the disturbance of the ecological balance of these resources. The boundaries of the MDOD are based on a range of both technical and aesthetic resource factors for the critical resource elements that include:

- Elevation: Above 700 feet mean sea level for the Short Hill and Blue Ridge Mountains and 550 feet for the Catocin, Hogback, and Bull Run Mountains.
- Soils: Associated with mountainsides that affect groundwater recharge, slippage potential, and suitability for onsite sewage disposal systems.
- Slopes: Moderately steep slopes (15 to 25 percent) and steep slopes (greater than 25 percent).
- Forests: The quality and extent of tree cover, woodlands, and forests.

Mountainside areas are divided into the following areas depending on the elevation and the types of resources present as determined by weighted analytical criteria:

- **Somewhat Sensitive:** Areas at lower elevations with slight or limited environmental and public health, safety, and welfare impacts from development.
- **Sensitive:** Areas at lower elevations with potentially moderate environmental and public health, safety, and welfare impacts from development.
- **Highly Sensitive:** Areas with potentially severe environmental and public health, safety, and welfare impacts from development and all land at higher elevations.

Mountainside Policies

1. The Mountainside Development Overlay District will be defined by elevation, soil types, and the presence of certain natural features such as forests, steep slopes, unstable soils, and groundwater recharge areas that are commonly associated with these areas.
2. All subdivisions of three lots or more will require a Special Exception in Sensitive and Highly Sensitive defined areas.
3. The County will manage development in mountainside areas using performance standards and regulations to minimize negative environmental impacts, minimize land disturbance, protect the ridgelines, maintain woodlands, plant, and wildlife habitats; and preserve natural features and rural character as requirements for approval of the location of proposed development.

4. The County encourages that mountainside areas be placed under permanent open space easement using voluntary donation and public investment through the Purchase of Development Rights program.
5. The County will seek the expansion of recreational opportunities in mountainside areas, including the development of public park sites and improving access to existing recreational facilities such as the Appalachian Trail.
6. Non-compliance with the policies and associated adopted performance and land use standards will be subject to fines and remediation requirements. The County will exercise strict enforcement practices to ensure the preservation of the Mountainside Development Overlay District.

E. Forests, Trees and Vegetation

Loudoun County has some of the state's best hardwood stands for lumber and veneer production. The County's forests and trees also improve air and water quality, offer important habitat for birds, small mammals and other wildlife, and are excellent buffers between communities. Forests and trees conserve energy by providing shade and evaporative cooling through transpiration. They also reduce wind speed and redirect airflow; reduce stormwater runoff and soil erosion; and can increase real property values. Riparian forests along streams provide the greatest single protection of water quality by filtering pollutants from stormwater runoff, decreasing stream bank erosion, and maintaining the physical, chemical, and biological condition of the stream environment.

Because forests and trees are such a valuable resource in Loudoun, they will be protected for current and future use and enjoyment by establishing a Tree Preservation Ordinance that protects large forest areas, urban forests and individual trees, while preserving existing vegetation and protecting plant and wildlife habitats. Existing vegetation is a superior habitat resource for new tree plantings because they retain essential ecosystem components that support tree and forest re-growth.

The County will require tree conservation plans to be submitted and approved for each developing parcel at the time of the initial land development application. These plans should be reviewed for conformance with minimum viability standards and the likelihood of long-term forest, tree and vegetation survival.

Forests, Trees and Vegetation Policies

1. The County will seek and encourage—through incentives—the preservation, protection, and management of forest resources for their economic and environmental benefits.
2. Forests and indigenous vegetation will be preserved on steep slopes (greater than 25 percent). On moderately steep slopes (15-to-25 percent grade), clearing will be limited to only essential clearing necessary for home construction, road construction and utility installation. Silviculture activities may be allowed on moderately steep slopes provided that an approved Forest Management Plan is implemented.
3. The submittal and approval of a Forest Management Plan will be required prior to any land development. This plan will demonstrate a management strategy that ensures the long-term sustainability of any designated tree save areas.
4. The County will require property owners pursuing silviculture operations to develop Forest Management Plans using resources available through the Virginia Department of Forestry.
5. The County will promote the preservation of forested areas through the use of Agricultural and Forestal Districts, easements and other voluntary means.

6. Forests are an integral part of the Mountainside Development Overlay District regulations. The County will continue to protect forest resources through the implementation of the Mountainside Development Overlay District.
7. Tree protection will be encouraged along roadways to allow trees to provide shading, reduce peak storm flows, and contribute to the enhancement of the Green Infrastructure.
8. The County will develop and adopt a Tree Preservation Ordinance for the three Policy Areas in the County as a priority.
9. The County will inventory and map, and create and maintain a database of trees and indigenous vegetative resources to be preserved or managed in accordance with County standards. The inventory will include, but not be limited to, old growth forests, significant tree stands, specimen trees, heritage trees, and State or National Champion trees.
10. The County will develop and apply incentive-based approaches to encourage the preservation of existing vegetation and wildlife habitat on developing properties as a priority.
11. The County will explore the protection of inventoried flora, vegetative cover, and plant communities through both regulation and incentive-based approaches.

F. Plant and Wildlife Habitats

Plants and animals play an important role in nature's lifecycle and its ecosystems. For wildlife habitats, large contiguous parcels of natural open space are preferable to more numerous, but disconnected and smaller areas.

While many high-quality plant and animal habitats have already been lost or altered due to land development, the County still has a number of unique and natural habitat areas. The largest contiguous areas of forest and naturally vegetated land are on mountainsides and along stream channels. These areas play a key role in preserving the abundance and diversity of the County's remaining plant and wildlife. They are also a part of the Blue Ridge ecosystem, a 550-mile, contiguous natural area of parks, national forests, federal wilderness and the Appalachian Trail that extends from Georgia to Pennsylvania.

The integrated Green Infrastructure approach will help to prevent habitat fragmentation, while enhancing ecological connections with larger natural areas. The County will strive to protect, preserve, and create large-scale plant and wildlife habitats that overlap with other important resources and resource systems within the Green Infrastructure.

The County will also protect habitat for rare, and threatened and endangered plant and animal species in accordance with the Federal Endangered Species Act. The health and survivability of plants and animals can often foretell future environmental threats to human life and health. Therefore, the County will encourage the study of the biological processes within the natural resource elements of the Green Infrastructure.

Plant and Wildlife Habitats Policies

1. The County will seek to protect areas of natural biodiversity and rare, threatened and endangered plant and animal species through regulations that foster the implementation of the Federal Endangered Species Act.
2. One strategy the County will pursue to protect rare, threatened, and endangered plant and animal

species is to preserve their habitat in open space, passive recreation, or nature preserves.

3. The County will promote and support the establishment of public and private nature preserves throughout the County, in addition to Banshee Reeks, as part of the protection of the Green Infrastructure.
4. The County will conserve and protect wildlife habitat through the preservation of a broad range of natural resources such as indigenous vegetation, forest cover, woodlands, floodplains, streams and stream corridors, wetlands, and undeveloped areas associated with steep slopes.
5. The County promotes the preservation and management of existing vegetative cover, and riparian, habitat and wildlife travel corridors (i.e., fencerows and stream valleys) for their native biological diversity and to protect wildlife access to streams and other water sources. Planting of indigenous vegetation will be encouraged and priority will be given to those corridors that connect one or more large, intact nature preserves.
6. The County will establish and implement guidelines and/or incentives to protect wildlife habitat in an effort to protect a broad range of natural resources that cover large areas such as river and stream corridors and mountainsides.
7. The County promotes the protection of the County's vegetative and wildlife resources and the creation of wildlife habitats by encouraging the incorporation of indigenous vegetation into the landscape design of new development and encouraging a compact, concentrated development pattern.
8. The County will use the Virginia Department of Conservation and Recreation, Division of Natural Heritage's Biological and Conservation Data system to identify Loudoun County's natural heritage resources. These resources include rare, threatened and endangered plant and animal species; exemplary natural communities, habitats, and ecosystems; and other natural features of the County. The County will apply this information in the evaluation of development proposals. For those development applications that have a likely presence of one or more natural heritage resource, the County will require the applicant to conduct a species assessment and develop a plan for impact avoidance in cases where the presence of the species is identified.
9. The County will encourage the study of natural heritage resources by qualified research organizations such as the Virginia Division of Natural Heritage of the Department of Conservation and Recreation.

Group Two: Heritage Resource Assets

This group includes elements of the Green Infrastructure that have past or present cultural or heritage significance for the County. The identified historic, archaeological and scenic resources, through their preservation and inclusion in the Green Infrastructure, will enrich and perpetuate the County's heritage. These elements are or will mostly be in private ownership, while the public's interest will be addressed through various stewardship and management approaches. Regulation of protective buffers, donation of open-space easements, and performance standards will be used to manage these elements and their relationship to other Green Infrastructure elements with the County. A number of implementation instruments will also be employed, including state and federal programs, County historic districts and zoning regulation, mapping and surveying, and the application of conservation design.

A. Historic and Archaeological Resources

The County has an unusually high number of historic and prehistoric sites that, along with scenic resources, farms and open spaces, are major components of its unique rural character and economy. Over 1,100 historic structures and sites and over 300 archaeological sites have been surveyed and mapped; and there is potential for identifying many more. These heritage structures and sites comprise a valuable resource that has enormous cultural, aesthetic, and economic value to the residents of the County. Along with the rural landscape in which they are set, historic sites represent the County's largest tourist attraction. The County will continue to be aggressive in its efforts to preserve both its heritage and cultural history for the benefit of present and future citizens.

Loudoun County was one of the first jurisdictions in the United States to adopt rural historic districts when the first Aldie, Waterford and Oatlands districts were adopted in 1972, followed by the 10,000-acre Goose Creek District in 1977. There are now six County-administered districts, including Aldie, Bluemont, Goose Creek, Oatlands, Taylorstown, and Waterford. (Refer to Historic Districts Map, pg. 5-37) The incorporated Towns of Leesburg and Middleburg also administer local historic districts through their zoning ordinances. The County has 49 sites that are on both the Virginia Historic Landmarks Register and the National Register of Historic Places. There are also five National Historic Landmarks in the County; including Balls Bluff Battlefield, Dodona Manor, Oatlands Plantation, Oak Hill, and Waterford.

The archaeological sites that are currently mapped are almost entirely prehistoric Native American sites, some of which date to 8,000 BC. Most of the identified prehistoric sites are east of Leesburg where there is considerable danger of impact from new development, particularly to those sites not in floodplains. These sites represent an important link to the County's past, and every effort will be made to discover and map them before they are lost to development.

Protection for some of the County's historic structures comes from design guidelines contained in the Zoning Ordinance, but the ordinance protects only the designated County-administered historic districts. State and national designations are primarily honorary. Loudoun County will continue its existing protection programs, but refine its policies and regulations to address the potential impacts of land use changes on heritage resources.

In many cases, historic structures are closely linked to their settings. Open space and scenic corridors help to define the context of historic and archaeological structures. The County seeks to define a comprehensive heritage resources policy that recognizes that protecting the environment and rural character of Loudoun County is fundamental to the preservation of valuable historic structures and archaeological sites.

Historic and Archaeological Resources Policies

1. The County will conduct a comprehensive survey of its heritage resource base and will prepare and implement a plan for the preservation and promotion of these resources as an integral part of the economy.
2. The County will base its historic, architectural and archaeological resource strategy on the following:
 - a. Preservation of the County's cultural and scenic character by conservation of archaeological sites and historic structures and their settings and major publicly-accessible geological features such as rock outcrops which reveal the County's geological evolution and heritage.
 - b. Establishment of land uses compatible with historic, open space, and scenic view areas.
3. The County will conduct a comprehensive architectural and archaeological survey of the County's

historic and prehistoric cultural resources. Under federal guidelines, any structure fifty years old or older should be evaluated for historic significance based on criteria set forth in the U.S. Secretary of the Interior's Standards for Archaeology and Historic Preservation (National Historic Preservation Act [16 U.S.C. 470]). Simultaneously, the County's cultural resource inventory will be updated through the land development process.

4. The County will evaluate the historic or archaeological value of inventoried resources based on criteria set forth in the Secretary of the Interior's Standards that include historic content and site integrity. Resources will be evaluated for consideration for State and National Registers.
5. The County will maintain its database by using the County's inventory of cultural resources as a dynamic body of data to be reevaluated as needed and as dictated by land use changes.
6. Concurrent with the countywide cultural resource inventory and evaluation, the County will formalize its research materials and general policies by developing a Preservation Plan for review and adoption by the Board of Supervisors. The Preservation Plan will be incorporated into the County's Comprehensive Plan as the primary planning tool for the protection and preservation of the County's vast cultural resources. Strategies for public education will be addressed in the Plan.
7. Using the data from the comprehensive cultural resource survey, the County will create a County Historic Landmarks Inventory, which will reflect those historic structures and archaeological sites that have local historic value and represent the prehistoric and historic traditions of Loudoun County. Special consideration will be given for the protection of these sites during the development process.
8. The County will protect structures and other features of historic significance in the context of their natural settings and will work with landowners to convey the historic value of the resource to the community at large. Structures and other features of particular historical significance will be retained, restored, or utilized in adaptive reuse as part of a conservation design process.
9. The County will develop incentives for and give preference to adaptive re-use of historic structures as part of new development, and/or will buffer historic structures and landscapes from new development to maintain a measure of historic context.
10. The State Code enables local governments to give partial tax credits for historic residential and commercial renovations. The County will implement this option as an incentive to homebuyers and developers to encourage adaptive re-use and the preservation of historic structures.
11. The County will require an archaeological and historic resources survey as part of all development applications. This survey must include a plan for recordation and preservation of identified resources and measures for mitigation and adaptive reuse.
12. Prior to issuing a demolition permit for a structure fifty years old or older, the County would be required to assess the historic significance of that structure.
13. The County will work with residents to identify and establish additional Historic Districts.
14. The *Historic District Guidelines* will be updated to include new districts as they are established and to recognize and give appropriate importance to the current rural-suburban character of the Goose Creek Historic District.

15. The boundaries of the County's Historic Cultural Conservation Districts will be amended or extended to coincide with the boundaries of the state's corresponding Historic Districts. This applies to Bluemont, Goose Creek, and Waterford. The County will work with the state to extend the state-registered boundary of Aldie to meet the County Aldie Historic District boundary.
16. The County will develop and implement a program of easements and other programs as methods of ensuring preservation and conservation.
17. The County will pursue certified local government status to be eligible to receive grant money earmarked for heritage resource preservation efforts.

B. Scenic Areas and Corridors

While ideas about what is scenic may vary, people generally agree on what areas and places are the most visually appealing. These areas and places often include many of the same resources (or combinations of resources) that are addressed as part of the County's Green Infrastructure. Often, significant scenic resources coexist with historic structures or are a part of a mountainside area, stream valley or other natural setting.

Scenic views are often associated with the roads, highways, rivers, and streams from which they are most often enjoyed; as well as with agricultural lands, mountainsides and other features that make up these vistas. Loudoun's rural roads, agricultural fields, hedgerows, crop fields, farmhouses, barns, crossroad churches, and villages all contribute to the scenic areas and corridors in the County.

The state has designated Routes 15, 665, 662, 673, 681, 690, 704, 719, 722, 728, 731, 734, and a portion of Route 7 (Colonial Highway, from Route 699 to Route 287, approved February 2001), as Virginia Byways. The County will pursue additional Virginia Byways designations for roads such as Charles Town Pike (Route 9), Harper's Ferry Road (Route 773), Route 50 through the Mosby Heritage Area, and Route 626 in its entirety (including Foxcroft, Bloomfield, and Foggy Bottom Roads). The County will also pursue the establishment of the Beaverdam Historic Roadways District for the 32 rural roads identified as historic, and the Evergreen Mill Road Historic Roadway District. Likewise, Catoctin Creek and Goose Creek have been designated as State Scenic Rivers; and the County has designated historic, mountainside, and river and stream corridor districts that protect elements of the scenic landscape and critical cultural and natural resources.

Scenic Areas and Corridors Policies

1. The County will prepare special provisions such as additional setback depths, protections against clearing frontage vegetation, and for maintaining stonewalls and other features in designated scenic areas and corridors.
2. The County will prepare and implement corridor management plans for the County's Virginia Byways. The County will also work proactively with residents to identify potential roadways for Virginia Byway designation by the Commonwealth.
3. The County will pursue Virginia Byways designation by the Commonwealth for Charles Town Pike (Route 9), Harper's Ferry Road (Route 671), Edwards Ferry Road (Route 773), Route 50 (through the Mosby Heritage Area), and Route 626 in its entirety.
4. The County will work proactively with residents to define and designate Historic Roadway Districts. Through public education and outreach efforts, the County will stress the importance of heritage resource protection and preservation as a means to protect and preserve the character of the County's

rural roads.

5. The County will work proactively with residents to define and designate Historic Access Corridor Districts. Through public education and outreach efforts, the County will stress the importance of heritage resource protection and preservation as a means to enhance the visual experience along the County's corridors leading into and through historic towns and villages.
6. No street or road should be abandoned to a non-governmental owner if the road can be used as part of a planned trail network.

Group Three: Open Space Assets

Group three includes elements of the Green Infrastructure that are best described as man-made open space, including greenways and trails, parks and recreation, public school sites, and open space easements. These elements can enhance the vibrancy of communities by providing public interaction with nature and opportunities for outdoor activity. Open space assets may be held in either private or public ownership or a combination thereof, although public ownership predominates in parks, sport complexes, athletic fields, and greenways and trails.

Regulation of protective buffers, donation of open-space easements, purchase-of-development rights, and performance standards will be used by the County and individual property-owners to manage these elements.

A. Greenways and Trails

The County is committed to establishing an integrated greenways and trails system that will provide for walking, bicycling, and equestrian use. Wherever appropriate, the County system will connect to the system of homeowner association (HOA) trails. The greenways and trails system will provide the vital link between communities and the larger open space assets and natural elements of the Green Infrastructure.

Greenways and Trails Policies

1. The County will prepare and implement a Greenways and Trails Plan identifying desired locations of future greenways and trails and desired connections to neighboring jurisdictions' greenways and trails. Trails may include hiking, biking and equestrian trails. Greenways include areas along rivers and streams that are often ideal for trails. This plan, updated periodically, will be made a part of the Comprehensive Plan.
2. The County's greenways and trails, as depicted in the Greenways and Trails Plan, will serve as a linking element in all policy areas to other components of the Green Infrastructure, and may be used for refuge, recreation, and education. The system should connect to existing trails like the Appalachian Trail in the Rural Policy Area and trails within towns and villages, and link people to the area's natural, recreational, cultural, and commercial resources. Signage on the greenways and trails system will be limited to providing information regarding public facilities, safety, and historic amenities open to the public.
3. The County designates priority trails to include:
 - a. An extension of the W&OD Trail from its present terminus in Purcellville to its proposed terminus in Bluemont with a foot path extending from Bluemont to the Appalachian Trail;

- b. A 2.4 mile shared-use trail from the western terminus of the W&OD Trail in Purcellville, west to Round Hill through Franklin Park;
 - c. A 1.1 mile, pedestrian walkway and bicycle path along Colonial Highway (Business Route 7) between the Town of Hamilton and the Harmony Intermediate School;
 - d. A connector between the W&OD Trail in Leesburg and Whites Ferry on the Potomac River (a 4.5 mile connection);
 - e. The Potomac Heritage Trail (hiking from Fairfax to Harpers Ferry, WV);
 - f. A linear park and shared-use trail along the former Manassas Gap Railroad right-of-way linked to the W&OD Trail, or incorporated into a trail network as depicted on the Green Infrastructure Map on pg. 5-3;
 - g. The development of a shared-use trail from the C&O Canal to the Town of Lovettsville along the Route 287 corridor;
 - h. The development of a three mile shared-use trail between Algonkian Regional Park and Claude Moore Park; serving the northernmost portion of Cascades south to Claude Moore Park and including a bicycle/pedestrian bridge crossing over Route 7;
 - i. Connections to the W&OD Trail, the Sterling, Dulles, Ashburn and Potomac Communities from Route 28 and Loudoun County Parkway corridors and appropriate developments;
 - j. Blue Ridge, Catoctin Mountain, Bull Run and Short Hill shared use trails;
 - k. Pedestrian and shared-use trails along other creeks;
 - l. A multi-use trail along the Berlin Turnpike through the Town of Lovettsville and connecting the W&OD and C&O trails;
 - m. Networks of sidewalks and multi-use trails in each of the Towns.
4. The County will seek through public purchase, proffer, density transfer, donation or open-space easement, the preservation of greenways and the development of trails. Priorities for acquisition and/or development are:
- a. The extension of the W&OD Trail from its present terminus in Purcellville to its proposed terminus in Bluemont with a foot path extending from Bluemont to the Appalachian Trail;
 - b. A connector between the W&OD Trail and Whites Ferry;
 - c. A Short Hill Trail;
 - d. The development of the Potomac Heritage Trail (hiking from Fairfax to Harpers Ferry, WV);
 - e. The development of Blue Ridge, Catoctin Mountain and Bull Run Trails;
 - f. The development of pedestrian trails along other creeks;
 - g. The former Manassas Gap Railroad right of way and preserving or developing this corridor as a linear park and trail possibly linking it to the W&OD Trail, or incorporating into a trail network as depicted in the Green Infrastructure Map and Greenways and Trails Plan;
 - h. Cascades community to Claude Moore Park to the W&OD Trail; and
 - i. Connect Franklin Park to Round Hill and to Purcellville.

B. Parks and Recreation

Regional and county parks are important man-made open space assets of the Green Infrastructure that not only serve their passive and active recreational purposes, but also provide a link between communities and other Green Infrastructure elements. Individual parks and recreational assets are discussed in the Suburban, Rural and Transition Policy Area chapters, while the administrative aspects of the County's parks are addressed in Chapter Three.

Parks and Recreation Policy

1. The County will apply conservation design techniques in the design of new parks and athletic facilities and will locate them to provide links between public facilities and communities, to protect environmental integrity, and to provide buffers between different land uses.

C. Public School Sites

Public schools provide extensive open space in Loudoun's communities. These facilities are used not only for their primary educational purpose, but are also community assets and the focal point for active recreation and after-school programs that benefit the public at-large. Therefore, like parks and recreational facilities, the County recognizes that public school sites should be linked with other elements of the Green Infrastructure and connected through trails and greenways.

General policies for public schools are presented in Chapter Three.

D. Open Space Easements

A number of open space easements can be found throughout the County. (Refer to the Green Infrastructure Map, pg. 5-3) Many complement and protect natural features like rivers and streams, others protect historic locations or key agricultural areas, while others provide recreational and educational opportunities in the form of parks and nature preserves. The County will continue to encourage the use of open space easements as a way to complement and enhance the Green Infrastructure and its elements.

Group Four: Complementary Elements

Group Four includes elements that are not directly a part of the land-based Green Infrastructure but instead, complement it. They include air quality, lighting and the night sky, and the aural environment. These elements are predominantly in private ownership, although some public ownership applies for the airspace that is managed by the Metropolitan Washington Airport Authority (MWAA).

A. Air Quality

Loudoun County's air quality is threatened by air pollution from automobile and aircraft emissions, heating furnaces, and power plants. More efficient and better planned transportation and pedestrian networks, tree preservation and planting, reforestation and preservation of natural landscapes will help minimize the threat to the County's air quality.

In order to meet the federal goals of the Clean Air Act, the County offers an integrated land use approach that protects air quality by planning development in locations that are close to major transportation facilities and transit nodes, reducing the densities in the Rural Policy Area, and promoting and implementing alternative modes of transportation. The policies and guidelines of the *Revised Countywide Transportation Plan* also support this approach.

Air Quality Policies

1. The County will develop land use and transportation policies and measures that tend to reduce single occupancy vehicular trips, vehicle miles traveled, and associated emissions in order to improve air quality. Such measures will support the creation of pedestrian and bicycle facilities, park-and-ride lots, and mass transit options.
2. The County will promote tree planting and preservation as a means to improve air quality.
3. The County will enforce the Virginia State Law (9VAC5-40-5630) prohibiting open burning during an alert, warning, or emergency stage of an air pollution episode as described in Virginia State Law (9 VAC5-70-10 et seq.).
4. The County will comply with the requirements of the Federal Clean Air Act Amendments of 1990 through support of the State Implementation Plan (SIP).
5. Loudoun County acknowledges its location in the Washington, D.C.-MD-VA Non-attainment Area. The County will continue to play an active role on the Metropolitan Washington Air Quality Committee (MWAQC) and the National Capital Region Transportation Planning Board (TPB) and will do its part in the implementation of the Phase II Attainment Plan for the Washington Metropolitan Nonattainment Area, as well as future emissions reduction programs.

B. Lighting and the Night Sky

The beauty of the County's night sky is threatened by excessive and improper lighting. Artificial lighting is intended to be minimized and light pollution reduced while maintaining the primary purpose of lighting for public safety and visibility. The County will develop appropriate regulations and performance standards to promote quality and energy-efficient lighting that will also preserve the natural beauty of the night skies. Application of sound night-lighting standards will reduce light pollution such as glare, energy waste, light trespass, and the deterioration of the natural nighttime environment.

Lighting and Night Sky Policies

1. The County will adopt a lighting ordinance to achieve the following:
 - a. Promote the use of lighting for convenience and safety without the nuisance associated with light pollution.
 - b. Promote a glare-free environment through proper lighting performance standards to improve visibility and enhance public safety.
 - c. Promote appropriate lighting standards to conserve energy.
 - d. Develop appropriate lighting standards to prohibit unnecessary and intrusive light trespass that detracts from the beauty and view of the night sky.

C. Aural Environment

Loudoun County's efforts to protect existing and future residents from increased levels of environmental noise have focused primarily on airport noise surrounding Washington Dulles International Airport and Leesburg Executive Airport. In order to ensure a high-quality environment for both existing and future residents, as well as maintaining the economic viability of these important transportation and economic development resources, an Airport Noise Impact Overlay District was established to impose development restrictions within specified areas.

Public notification of airport impacts on a residential community is required for areas within one mile of the Ldn 60 noise contour. In addition to the notification provision, properties located within the Ldn 60 to 65 range are required to provide acoustical treatment of structures and to grant aviation easements. (Refer to Airport Ldn Contours Map, pg. 5-43)

Loudoun County also has many employment and activity centers that create various levels of noise and require consideration and, in some cases, abatement to meet public welfare and health objectives. The County will strengthen policies regulating noise produced by large-scale construction projects (e.g., use of explosives should be limited by operating hours and/or decibel levels).

The County recognizes that quarries are valuable employment and economic development resources for the County. As such, the Zoning Ordinance provides a Quarry Notification Overlay District that requires notification to residential property owners about the potential noise levels generated by neighboring quarry operations. The ordinance also sets performance standards to limit quarries' hours of operation.

It is also important to protect residential communities near or adjacent to major collector roadways. This is accomplished through the use of passive noise abatement measures such as adequate setbacks, earthen berms, wooden fences, and dense tree vegetation. The County discourages the use of structural noise abatement measures such as concrete walls unless supplemented with appropriate landscaping to enhance the aesthetics of such structures. Abatement barriers should reflect the character of the surrounding natural environment.

To protect residents adjacent to major highways, the County will also require appropriate noise mitigation measures to be incorporated into the overall project design for proposed noise-sensitive development when the absolute values in the Noise Abatement Criteria (NAC) Hourly A-Weighted Sound Levels table are approached or exceeded (see pg. 5-45).

Noise Abatement Criteria (NAC) Hourly A-Weighted Sound Levels

Activity Category	dB(A) Leq (h)	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residential yards, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Commercial uses or developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Airport Noise Policies

1. The County will continue to support the economic viability of Washington Dulles International and Leesburg Executive Airports by continued and complete prohibition of new residential and other noise sensitive land uses from the areas defined by the projected Ldn 65 and greater noise contours for both airports and by requiring non-noise sensitive land uses within these noise impact areas.
2. The County will work with the Metropolitan Washington Airports Authority and the Town of

Leesburg to analyze long-term airport noise potential using the Integrated Noise Model in order to project aircraft noise contours based upon assumptions about aircraft fleet mix, generalized flight tracks, and other operating procedures around Washington Dulles International and Leesburg Executive Airports for use in noise abatement policy formulation.

3. The County will continue to work with the Metropolitan Washington Airports Authority to refine airport operations and routes at Washington Dulles International Airport to minimize the effects of noise on multiple and single family lots, schools, and churches, public parks and recreational open space.
4. For the environs of Washington Dulles International Airport, the County will base its Aircraft Noise Compatibility planning efforts upon the map entitled, Noise Exposure Map: Potential with a Preferential Runway Use, Ldn 60 and 65, dated August, 1992, and prepared by KPMG Peat, Marwick for the Metropolitan Washington Airports Authority (MWAA). For the environs of Leesburg Executive Airport, the County will base its Aircraft Noise Compatibility planning efforts upon the Environmental Assessment Report, Leesburg's Godfrey Field, Leesburg, Virginia, dated October, 1985, and prepared by Campbell, McQueen and Paris, Engineers of the Town of Leesburg.
5. An Airport Noise and Overflight Impact Area (ANOIA) is established as part of this Plan and consists of three (3) policy areas: (i) areas outside of, but within one mile of the Ldn 60; (ii) areas between the Ldn 60-65 aircraft noise contour; and (iii) areas within the Ldn 65 or greater noise contour.
6. For areas outside of, but within one (1) mile of the Ldn 60 contour, the County will require:
 - a. Full Disclosure Statement – For all new residential dwelling units to be constructed outside of, but within one (1) mile of the Ldn 60 contour. The applicant will disclose in writing to all prospective purchasers that they are located within an area that will be impacted by aircraft overflights and aircraft noise. Such notification will be accomplished by inclusion of this information in all sales contracts, brochures, and promotional documents, including the Illustrative Site Plan(s) on display within any sales related office (s), as well as in homeowners' association documents, and by inclusion on all subdivision and site plans, and within all Deeds of conveyance.
7. For areas between the Ldn 60-65 aircraft noise contours, the County will require:
 - a. Full Disclosure Statement – For all new residential dwelling units to be constructed between the Ldn 60-65 aircraft noise contours. The applicant will disclose in writing to all prospective purchasers that they are located within an area that will be impacted by aircraft overflights and aircraft noise. Such notification will be accomplished by inclusion of this information in all sales contracts, brochures, and promotional documents, including the Illustrative Site Plan(s) on display within any sales related office (s), as well as in homeowners' association documents, and by inclusion on all subdivision and site plans, and within all Deeds of conveyance.
 - b. Acoustical Treatment – For all new residential units located between the Ldn 60-65 aircraft noise contours. The applicant will incorporate acoustical treatment into all dwelling units to insure that interior noise levels within living spaces (not including garages, sunrooms, or porches) do not exceed a sound level of 45 db(A).
 - c. Avigation Easements – For all new residential dwelling units to be constructed between the Ldn 60-65 aircraft noise contours. Prior to or in conjunction with the approval of a rezoning application, the applicant of a parcel or parcels contained within the Ldn 60-65 aircraft noise impact area associated with Washington Dulles International Airport, should proffer the dedication of avigation easements to the Metropolitan Washington Airports Authority, indicating the right of

flights to pass over the property, as a means to securing the long-term economic viability of Washington Dulles International Airport.

8. For areas exposed to aircraft noise of greater than Ldn 65, the County prohibits the construction of new residential or other types of noise sensitive uses within those areas of Ldn 65 or greater.
9. The County will continue to enforce and update, as appropriate, the Airport Noise Impact Overlay District included as part of the Loudoun County Zoning Ordinance. Such district regulates land uses and provides acoustical architectural performance standards for construction which occurs within this area.

Highway Noise Policies

1. The County will require that all land development applications that propose land uses adjacent to any of the existing and/or proposed arterial and major collector roads will be designed to ensure that no residential or other type(s) of noise-sensitive use(s) will have traffic noise impacts which occur when the predicted traffic noise levels approach or exceed the noise abatement criteria on the Noise Abatement Criteria (NAC) Hourly A-weighted Sound Levels table, or when predicted traffic noise levels substantially exceed existing noise levels. To determine the predicted highway noise levels and to assess noise impacts at a particular location, a land development applicant will be required to use the latest version of the Federal Highway Administration's Highway Traffic Noise Prediction Model (FHWA-RD-77-108, as amended). The design year noise level will be understood to be the probable traffic volume for said facilities at a time of ten to twenty years from the start of construction.

For the purposes of these procedures, the design-year noise levels will be applied to:

- a. Areas that are regularly used by people and in which a lowered noise level would be beneficial. Such areas would not normally include service stations, junkyards, industrial areas, parking lots, storage yards, or the unused open-space portions of other developments and facilities. Design-year noise levels will, however, be applied to the gardens and yards of residential areas and those parks and recreation areas (i.e., open air amphitheaters, golf courses, etc.) or portions thereof where serenity and quiet are considered essential, even though such areas may not be subject to frequent human use; and
 - b. Those places at approximately ear-level height. The values do not apply to an entire tract upon which an activity is based, but only to that portion on which such activity normally occurs.
2. Those proposed land development applications that are determined to approach or exceed the noise abatement criteria on the Noise Abatement Criteria (NAC) Hourly A-weighted Sound Levels table will provide noise protection through the use of passive noise abatement measures such as adequate setbacks, earthen berms, wooden fences, and dense tree vegetation. The County discourages the use of structural noise abatement measures such as concrete walls unless the noise abatement criteria cannot be met. Noise walls should include design elements such as articulated walls and gradual descents that blend with natural features. Walls should be supplemented with appropriate landscaping and reflect the character of the surrounding natural environment.
 3. The County will use noise policies in the *Revised Countywide Transportation Plan* to further outline noise avoidance and mitigation requirements for residential uses, parks, recreational facilities, as well as public and quasi-public or other noise-sensitive land uses along arterial and major collector roads.

Construction Blasting Policy

1. The County will require developers using explosives within 500 feet of a structure to do a pre-and

post-blast survey to determine if any damage was done to nearby homes. The survey should include the impact on wells and drainfields, if applicable.